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# CLAIMS

1/ A method of automatically laying out pieces to be cut  
out from remnants of flexible material having non-uniform  
characteristics, and to be used for making articles, said  
5 method being characterized in that it comprises the steps  
consisting in:

establishing, for remnants of a determined type, at  
least one mask whose area is subdivided into various  
zones which correspond to different value levels of a  
10 characteristic of the material of the remnant;

assigning a set of constraints to at least some of  
the component pieces of a determined type of article,  
which set of constraints includes at least one value  
constraint for a characteristic of the material of the  
15 remnant;

defining links between at least some of the  
component pieces, which links have different levels as a  
function in particular of relationships imposed between  
constraints assigned to the pieces;

20 digitizing each remnant in order to obtain an image;  
applying to the image of each remnant the mask or  
each mask corresponding to the type of the remnant by  
performing dimension matching so as to subdivide the  
image of the remnant into various zones having uniform  
25 characteristics; and

laying out automatically by disposing the pieces in  
the zones of the image of the remnant as a function of  
any constraints assigned to the pieces, and in compliance  
with the links defined between the pieces.

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2/ A method according to claim 1, characterized in that,  
for a remnant of a determined type, at least one mask is  
established chosen from:

a mask comprising zones having different values for  
35 the color shade of the material; and

a mask comprising zones having different values for  
a surface appearance characteristic of the material.

3/ A method according to claim 2 for automatically laying out pieces to be cut out from hides so as to be used to make articles of leather, said method being characterized in that a mask is established that comprises zones having different values for the grain of the leather.

4/ A method according to ~~any one of claims 1 to 3,~~<sup>Claim 1</sup> characterized in that a mask is applied to the image of a remnant by causing reference axes respectively associated with the mask and with the remnant to coincide.

5/ A method according to claim 4 for automatically laying out pieces to be cut out from hides so as to be used to make articles of leather, said method being characterized in that an axis corresponding to the backbone of the animal from which the hide is taken is used as the reference axis.

6/ A method according to claim 4 ~~or 5,~~ characterized in that the reference axis is determined by indicating or marking it manually on the remnant.

7/ A method according to claim 4 ~~or 5,~~ characterized in that the reference axis is determined by analyzing the image of the digitized remnant.

8/ A method according to ~~any one of claims 1 to 7,~~<sup>Claim 1</sup> characterized in that at least some of the component pieces of a determined type of article are distributed into groups, and any links between the groups and between groups and pieces are defined.

9/ A method according to claim 8, characterized in that at least some pieces are distributed into functional groups, each of which comprises the component pieces(s) of a sub-assembly of the article.

*Claim 1*  
 10/ A method according to ~~any one of claims 1 to 9,~~  
 characterized in that at least some pieces are assigned  
 one or more constraints chosen from:

- 5        a value level for the color shade of the material;  
          a value level for a surface state characteristic of  
 the material; and  
          a preferential angular position relative to a  
 reference axis of the remnant.

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- 11/ A method according to claim 10, characterized in that  
 at least some pieces are assigned a preferential angular  
 position constraint relative to a reference axis of the  
 remnant, and are associated with angular position  
 15        tolerance data corresponding to a maximum allowed angle  
 of rotation relative to the preferential angular  
 position.

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- Claim 1*  
 12/ A method according to ~~any one of claims 1 to 11,~~  
 characterized in that links are defined<sup>1</sup> between at least  
 some pieces, which links have different levels as a  
 function of proximity constraints assigned to the pieces.

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- 13/ A method according to claim 12, characterized in that  
 the proximity constraints between two pieces are  
 expressed in the form of a maximum distance between two  
 characteristic points on the pieces, or in the form of a  
 maximum difference between values levels of one or more  
 characteristics of the material of the remnant.

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- Claim 1*  
 14/ A method according to ~~any one of claims 1 to 13,~~  
 characterized in that, for a remnant<sup>1</sup> of a determined  
 type, a possible coefficient of stretching of the  
 material in at least one determined direction relative to  
 35        a reference axis of the remnant is defined, and the  
 layout is defined by optionally using the defined  
 stretching capacity.

*a* 15/ A method according to ~~any one of claims 1 to 14,~~ <sup>Claim 1</sup>  
characterized in that at least some pieces or groups of  
pieces are assigned respective layout priority levels,  
5 and the laying out is performed in order of decreasing  
priority.

16/ A method according to claim 15, characterized in  
that, the higher the level of link between a piece or a  
10 group of pieces and another piece or group, the higher  
the priority level assigned to the piece or group of  
pieces.

*a* 17/ A method according to ~~any one of claims 1 to 16,~~ <sup>Claim 1</sup>  
15 characterized in that any flaws on each remnant are  
detected, and each detected flaw is associated with data  
representing one of a plurality of predetermined degrees  
of seriousness, and flaw information is stored comprising  
data indicating the locations of the flaws on the remnant  
20 and the associated data indicating the levels of  
seriousness.

18/ A method according to claim 17, characterized in that  
each of the component pieces of a determined type of  
25 article is associated with information representing the  
degree of flaw seriousness tolerated by said piece.